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AN IMPLICATION FOR THE INFORMATION SEARCH CONCEPT:
EFFECTS OF INCREASING SUCCESS AND FAILURE ON PERCEIVED INFORMATION QUALITY

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TECHNICAL REPORT
No. 9

February 1968

Prepared in connection with research under the Office of Naval Research,
Group Psychology Branch, Contract No. N00014-67-A-0226-0007, NR 177-911.

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ABSTRACT

The effect of experimentally-induced success and failure in a complex decision-making task on subjective estimates of information quality was obtained for information relevant to subjects' own decision-making area and that of a marginal group member. It was found that quality initially is perceived to improve. Estimates of quality for success and failure conditions do not differ until success and failure levels are quite high. Once high levels of success are reached, subjects in the success condition consider information as further improving, while subjects in failure conditions maintain previous perceptions. The implications of this result for complexity theory are considered. The relationship of the results to work on information search and information utilization is explored. Some suggestions for practical applications of the research results are made.

AN IMPLICATION FOR THE INFORMATION SEARCH CONCEPT:
EFFECTS OF INCREASING SUCCESS AND FAILURE ON PERCEIVED INFORMATION QUALITY¹

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Considerable research has been concerned with the effect of information on human behavior. Implicitly some of the work has dealt directly with the effect of information quality. For instance, from the view of information theory (e.g. Attneave, 1959), an amount of information that reduces uncertainty to a particular degree can be viewed as possessing "quality." In other words, information communicating a bite of information would be of higher quality than information communicating a bit of information. Similarly, information levels that produce optimal integrative information processing characteristics (Driver and Streufert, 1966; Schroder, Driver and Streufert, 1967) might be seen as possessing greater quality than information levels that produce less than optimal integrative information processing.

Such conceptualizations of information quality, although based on subject performance, are experimenter defined. What, however, is the subject's perception of information quality? A partial attempt to answer that question is made in this paper.

Streufert, Suedfeld and Driver (1965) have been concerned with the effect of environmental conditions on information search and information utilization. These authors have found that increasing information load results in generally decreasing information search. Similar results were reported by Suedfeld and Streufert (1966). One may ask whether this drop in information search decisions is entirely due to the increased quantity of information with which decision makers have to cope, or whether it is associated with perceived increased information quality that might be associated with increased information quantity (information load).

According to the theoretical propositions of Driver and Streufert (1966) and Schroder et al (1967), the structural effect of increasing information load on integrative information utilization should be similar to the effects of increasing success or failure levels. Recent data analysis has demonstrated that similarities between the structural effects of information load (cf. Streufert and Driver, 1965, 1967; Streufert, Driver and Haun, 1967; Streufert and Schroder, 1965; Streufert, Suedfeld and Driver, 1965; Stager, 1967) and similar effects of failure and success do exist. It appears as though stress (as defined by Schroder et al), no matter whether due to load, success or failure conditions, has a range of common properties.

One may question whether the decrease in information search decisions under increasing load reported by Streufert, Suedfeld and Driver (1965) is due to effects of this "stress" condition or due to increased information quality. A tentative answer to this question could be provided by an analysis of the effects of success and failure (the parallel stressors to the load conditions) upon information search.

Streufert, Streufert and Castore (1968) have indicated that information search characteristics are not greatly affected by increasing success or failure conditions, although integrative information utilization is affected in exactly the same fashion as it was by increasing information load characteristics. We must consequently draw the conclusion that information search is likely a content variable, which was affected by load (the quantity of information per unit time with which subjects had to cope) alone.

Does such a finding exclude potential effects of perceived information quality on information search? Assuming that the "human information processing" theory of Schroder et al (1967) and Driver and Streufert (1966) holds, and in the light of the results reported above, no effect would be likely if perceptions of information quality are closely tied to structural information processing. All structural effects of load, failure and success should be highly similar. If, however, these perceptions are due to the content component of the perceived environment, differential effects of load, success and failure conditions on quality perceptions become possible, and information search may be affected differentially by perceptions of information quality.

Streufert and Streufert (1968) have recently demonstrated that groups of subjects exposed to increasing failure conditions attribute as much cause to their own decisions as they credit to an opponent's decisions when they are asked to explain the basis of their present (failure) situation. These estimates of causality do not change over different failure levels. However, subjects in increasing success conditions tend to attribute more and more causality to their own decisions. These results provide an example of content (rather than structural stress) oriented perceptions, which are "irrational" in nature.

If attributions of quality to information would follow similar patterns, then one might expect that under high success conditions, subjects would consider information to be of higher quality than they would under low success, or low and high failure conditions. If, on the other hand, information quality perceptions are structurally determined (Driver and Streufert, 1966; Schroder et al, 1967), no differences between success and failure conditions should emerge.

In this research the effect of increasing failure and increasing success on perceived information quality is investigated. In addition to estimates of information quality concerning the subjects' own decision area, estimates of quality for information relevant to the decisions of a marginal group member are obtained.

METHOD

Subjects and Task

Thirty-six paid undergraduate male volunteers from an eastern state university were placed into eighteen two-man decision-making teams. Subjects were instructed to act as equal rank decision makers in a simulated international game situation. (The setting is discussed in detail in Streufert, Kliger, Castore and Driver, 1967.) Each team was given the task of making military, economic, intelligence, and negotiation decisions regarding an international conflict situation with some Vietnam characteristics. Teams were told that they were playing a game against another team which supposedly had been instructed to oppose them. All functions of the "enemy team" were pre-programmed and performed by the experimenters. Consequences of the subjects' decisions as determined by the experimenters (see below) were fed back to the subjects.

Eighteen subjects were placed into the "failure" condition, and eighteen others into the "success" condition. Methods of inducing failure or success are described below.

All dyads participated in the game for seven consecutive thirty-minute periods. To avoid an end effect, teams were not told which period would be the last. During each period, they received seven written messages, spaced in equal time intervals. Although the specific content of the messages differed, depending on the particular actions the group had taken, the general content and the failure-success components of the messages were held constant for all groups. During the first period, one out of seven messages reported a failure (or success), while all other messages were neutral in content. During the second period, two out of seven messages reported failure (or success), and so forth, so that during the seventh playing period, all messages reported failure (or success). In other words, the proportion of messages communicating failure (or success) varied from 1/7 in the first period of the game to 7/7 in the seventh (last) period. Previous research (e.g. Castore and Streufert, 1966) has shown that this method of inducing failure or success results in near equivalent subjective steps of failure or success perception.

Of the seven messages for each period, two reported on military, two on economic, two on negotiation, and one on intelligence activity. The order of the reporting activities and the failure (or success) content were randomized across messages. Subjects were told that they had responsibility to make military, economic and intelligence decisions. At the beginning of the game, they were introduced to another team member who would make negotiation decisions. Subjects never saw this person again, and contact with this "marginal" group member was maintained only through programmed messages about the negotiations.

Teams were permitted to make any decisions they saw fit to make as long as the decision did not violate the restrictions of the setting (for instance, teams were not permitted to invest more economic funds than had been "appropriated"). The subjects believed that environment was a direct outcome of their own performance. All subjects indicated on a rating scale that 80 per cent or more (mean percentage over periods) of the ongoing events were in their opinion due to their own decisions, or decisions of the supposed enemy team, rather than due to arbitrary causes.

Data Collection

After each thirty-minute game period, subjects were given a number of forms to fill out. One of these included a series of seven-point scales with the following instructions:

Indicate below your opinion as to the quality of the information you received during the last period in both listed areas.

Type of Information:

TACTICAL/ECONOMIC/INTELLIGENCE _____:_____:_____:_____:_____:_____:

NEGOTIATION _____:_____:_____:_____:_____:_____:

Very high quality

Very low quality

RESULTS

A three-way mixed design analysis of variance was performed on the data. Main effects for success - failure (A, between, $F = 0.70$) and for own vs. marginal member's decision area (C, within, $F = 0.60$) were nonsignificant. The main effect for periods of increasing success or failure proportions (B, within, $F = 17.02$, $p < .01$) was significant. Interaction effects AxB ($F = 12.44$, $p < .01$) and BxC ($F = 4.36$, $p < .01$) were significant. Interactions AxC ($F = 2.18$) and AxBxC ($F = 1.73$) were not significant.

The results of this experiment point toward the importance of increasing success and failure for the perception of information quality. Both the main effect for periods of increasing success and failure proportions and its interaction effects with decision areas, and particularly with experimentally-induced failure vs. induced success, show significance. In line with this finding, further analysis by the post hoc Newman-Keuls method of the effects of increasing failure or increasing success proportions on groups exposed to failure or success were made (based on the AxB interaction). For this purpose, data from decision areas were combined.

Significant Newman-Keuls values ($p < .01$) were obtained for comparisons of failure condition (periods of increasing failure) 1/7 versus all other conditions. Significance was also obtained for success conditions 1/7, 6/7 and 7/7 compared with all other success conditions. Comparisons between failure and success induction for comparable periods were significant ($p < .01$) for failure/success condition 6/7 and for condition 7/7. The results are presented in

graphic form in Figure 1.

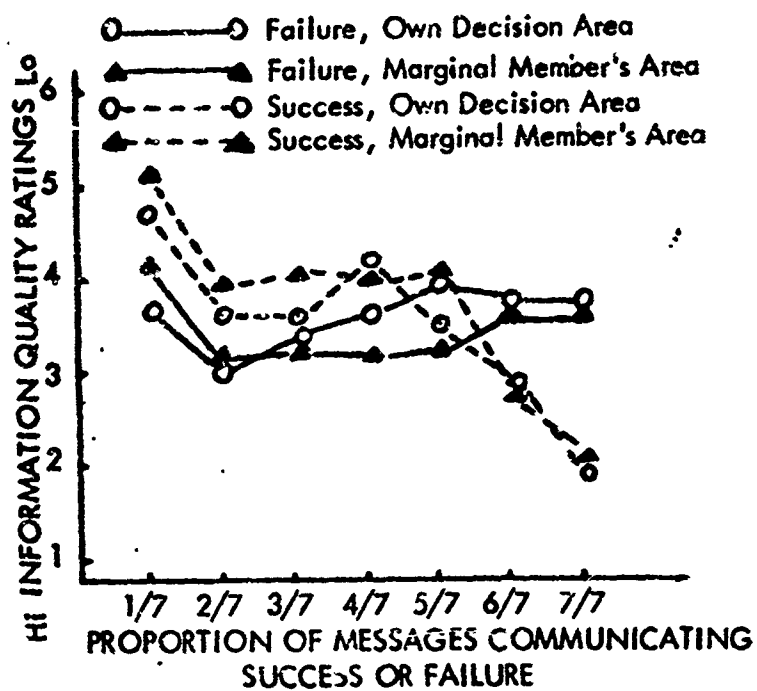
We would be led to conclude that initial ratings of information quality tend to be moderately low; however, they increase quickly and remain generally constant with further increasing success or failure. The exception to this pattern is the further increase of perceived information quality when success reaches rather high levels. This perception of further increased quality produces the only differences between failure and success conditions.

DISCUSSION

One might argue that the ratings for information quality generally (except for the success condition when proportions of success messages reach 6/7 and 7/7 levels) remain constant and that the initial drop in perceived information quality between periods of failure or success proportions 1/7 and 2/7 are due to a beginning effect, or due to lacking quantity of information (after only one-half hour of play and seven informative messages) with which quality could be sufficiently associated. However, such an interpretation is not warranted, since data obtained in initial periods of previous runs of the experimental game when information load (quantity of information per unit time without success or failure components) was varied did not indicate such an effect.

Consequently, we would interpret this result as an outcome of low failure - success conditions with the associated stress levels proposed by Driver and Streufert (1966) and Schroder et al (1967). It is this same effect that produced low attribution of responsibility levels to own and opposing team's decisions for the initial success and failure periods in the data reported by Streufert and Streufert (1968). In this light, the results for periods with success and failure proportions 6/7 and 7/7 are particularly interesting. At success levels where Streufert and Streufert report subjects taking increasing credit for their success, but where subjects who are failing do not take more (or less) credit for failure levels, subjects also perceive information as being of higher quality. It appears that high success levels have a specific evaluative effect which tends to color all perceptions in a favorable direction. It is interesting that failure induction does not produce the opposite result,

Figure 1: Effects of Failure and Success on Subjective Estimates of Information Quality.



as one might have predicted from the Schroder et al (1967) theory. Apparently success at high levels produces considerably more perceptual stress (in terms of that theory) than equivalent levels of failure. Based on the data of Streufert and Streufert (1968) and the results reported here, further research on perceptual effects of high failure vs. success levels seems indicated.

The finding that estimates of information quality are differentially affected by induced success and failure has further implications for information search. The data reported above clearly indicate that information quality perceptions are either not effects of structure, or if they are, are strongly modified by the content components of the failure - success variation. We might consequently expect differential effects of failure and success conditions on information search. If information quality increases, the need for "good" information upon which decision making is based decreases proportionately. Although some of the discrepancy between needed "quality" of information and corresponding quantity of search may be diminished by the social desirability of information search (cf. Streufert, Suedfeld and Driver, 1965), one might expect that some search differences would emerge. If they do not become evident in quantity of search, they should produce at least some differences in search quality (which so far has not been measured). Under conditions where subjects can base decisions on supposedly "better" information quality, information requests (particularly if based on social desirability) are likely to be concerned with supporting or even immediately irrelevant information. While such information would be helpful in developments of long-term strategies (particularly for integrators), it may have little additional value for the point in time where the request for information is made. The results reported by Streufert, Streufert and Castore (1968) indicating that information utilization under high success conditions tends to be lower than under moderate success conditions would at least partially corroborate such an interpretation.

There may be a number of applied implications of this research. Decision makers who operate in complex environments (as in this game) are apparently easily misled by highly favorable information. If a reasonable analysis of environmental conditions under high success is necessary, some failures might be helpful to reduce the effect of "undiluted" success. If such failures are not provided in the environment itself, they should probably be provided by

external manipulation. Apparently such a procedure is not necessary after failure experience. It appears that decision makers perceive environmental conditions accurately and are able to cope with that environment rationally (although not integratively). Historical examples of military success that resulted in misperception of environment and enemy are not rare. Apparently incomplete success, both historically and experimentally, results in much more accurate perceptions and consequently more appropriate decision making. As stated above, some induced failure at times of high success levels appears appropriate.

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FOOTNOTE

- ¹ Research support from the Office of Naval Research, Group Psychology Branch, is gratefully acknowledged.

Unclassified
Security Classification

DOCUMENT CONTROL DATA - R & D		
(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)		
1. ORIGINATING ACTIVITY (Corporate author)		2a. REPORT SECURITY CLASSIFICATION
Purdue University		Unclassified
		2b. GROUP
3. REPORT TITLE		
An Implication for the Information Search Concept: Effects of Increasing Success and Failure on Perceived Information Quality.		
4. DESCRIPTIVE NOTES (Type of report and inclusive dates)		
Technical Report No. 9, February 1968.		
5. AUTHOR(S) (First name, middle initial, last name)		
Siegfried Streufert and Carl H. Castore		
6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
February 1968	11	14
8a. CONTRACT OR GRANT NO.	8b. ORIGINATOR'S REPORT NUMBER(S)	
N00014-67-A-0226-0007, NR 177-911	No. 9	
b. PROJECT NO.		
c.	9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)	
d.		
10. DISTRIBUTION STATEMENT		
Unlimited		
11. SUPPLEMENTARY NOTES		12. SPONSORING MILITARY ACTIVITY
		Group Psychology Branch Office of Naval Research
13. ABSTRACT		
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DD FORM 1 NOV 65 1473 (PAGE 1)
S/N 0101-807-6801

Unclassified
Security Classification

3ND PPSD 11152

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
<p>information search information quality decision making success failure simulation</p>						